3 1761 07472737 1

RURAL MOTOR EXPRESS
AND
HIGHWAY TRANSPORT ENGINEERING

PAPERS PRESENTED AT THE ANNUAL MEETING OF THE NATIONAL HIGHWAY TRAFFIC ASSOCIATION HELD IN NEW YORK CITY ON MAY 14, 1919

LIBRARY
APR 5 1957
UNIVERSITY OF TORONTO

H&SS
A
6230

National Automobile Chamber of Commerce, Inc.,
New York, 1919.

LIBRARY
FEB 15 1966
UNIVERSITY OF TORONTO

1049353

National Highway Traffic Association

DEVELOPMENT OF RURAL MOTOR EXPRESS THROUGHOUT THE UNITED STATES.

Presented by F. W. Fenn, Secretary, Motor Truck Committee, National Automobile Chamber of Commerce Before the Sixth Good Roads Congress and Exhibition, Parliament Bldg., Quebec, P. Q.

The greatest problem confronting us today, is the high cost of living, but we are fortunate in possessing two dominating factors, which if applied and applied in the right way, will tend to lower food costs to the place where it properly belongs. I refer to good roads and highway transportation. Highway transportation is already here, but, with the exception of a small percentage, our roads are not adequate to efficient haulage over them. To make this form of transportation efficient and economical we must have a solid road bed—heavy enough and firm enough to allow for speed and tonnage. You cannot have these if you are operating in mud. Mud retards progress, your operating costs increase and hence you are not able to give your patrons transportation at a figure which could be called economical, nor can you expect to receive from your operation the profit which would come to you if the operation was on a solid base. Therefore, under these conditions you would not be doing much in the way of lowering food costs to the consumer. The consumer, as well as the producer (the farmer) should be as much interested in better roads as the operator who uses them for economy in this line will affect all.

It has always been the practice to develop up to the existing demand. You would not build or make anything for which a demand did not exist. Taking the railroads as an example—development of load always preceded the development of the steel highway. In the early days wooden rails with iron bands were used because the traffic of the day did not demand more. However, as trains grew in length, cars became larger and locomotives became heavier, heavier rails were laid, ties were placed closer together, rock ballast was resorted to and stronger bridges built, the railroad had developed up to the demands which its tonnage was making upon its road-bed. Our tonnage for highway transportation is here and the most flexible machine in the world for hauling that tonnage is also when we apply the motor truck, but the highway must be built to carry them. We must not build as we built to carry horses and wagons, for if we do, we are not following natural laws, but are wasting our money and our efforts.

You are no doubt aware that the Rural Motor Express is even now ahead of highway development, for it is operating in every state and every community within our states, and its influence is being felt by the farmers, in increased production and bigger profits and by the consumer through larger supplies and ultimately lower costs. The Rural Motor Express had its birth with the war coming up in a time of need, when the world was calling for food and when we were paying a price that was staggering.

Roy D. Chapin as Chairman, R. C. Hargreaves as Secretary of the Highway Transport Committee of N. D. at Washington, originated the plan which was to reorganize the transportation system of America.

The National Automobile Chamber of Commerce through its National Motor Truck Committee undertook the work of organization, co-operating with Mr. Chapin's Committee and now after a brief space of time we find this new form of transportation taking form in the way of hundreds upon hundreds of lines of Rural Motor Express which are opening up our waste places and bringing millions of acres of the most fertile soil into easy reach, so that the products raised thereon may be easily and economically brought out where we may have them for consumption.

Hon. John M. Baer of North Dakota in a speech in the House of Representatives stated: "A new and scientific method of marketing is a problem that surpasses every other economic movement in its importance. Every plan to obtain for the farmer a greater share of what he produces and at the same time to reduce the cost of living for the consumer demands the immediate attention and earnest consideration of every patriotic citizen".

He further states:

Mr. H. W. Collingwood, editor of the Rural New Yorker, who has made a life study of the subject of marketing, says that on a yearly average the farmer receives 35 cents for his products which cost the consumer $1.00. This authority is supported by another eminent expert, Mr. John Dillon, head of the Bureau of Foods and Markets of New York City, who declares that the ultimate consumer pays two-thirds of his dollar to the system of distribution. In other words, it costs a minimum of 65 cents to handle 35 cents worth of foodstuffs.

It is unnecessary to quote experts on the subject. Did not Mayor Shank of Indianapolis, recently go to Grand Rapids and buy several carloads of potatoes at 50 cents per bushel from jobbers—the farmers received 40 cents; and did he not sell them in his city for 75 cents per bushel when they were costing the consumer $2.00 per bushel in that city? He handled potatoes for 35 cents which the profiteers got $1.50 for handling.

The Report of the California Fruit Growers' Association shows that the grower received on an average for the past four years $1.60 per crate for oranges, while during the same period the consumer paid an average of $4.80. In New York City people pay 14 cents a quart for milk for which the farmer receives 5½ cents. In South Bend, Ind., while the farmer, 135 miles away, received 60 cents per bushel for tomatoes, they were selling for $3.00 per bushel. A farmer gets 20 cents a pound for cotton. We must pay $2.56 for that pound of cotton when woven. For a pair of shoes selling at $8.00, the farmer gets 75 cents for the leather and labor gets 45 cents.

The farmer sells his wool for 60 cents a pound. We must pay $4.75 for that pound of wool when bought as yarn. In Fargo, North Dakota, when the farmer was getting 60 cents for his wool, yarn was selling at $2.50—yarn spun at very little cost. Later, when the War Industries Board fixed the price of wool at 57 cents, yarn sold at $4.75. The price of the raw material was fixed; the price of the finished product was not. Through these wasteful methods of handling it costs from two to five dollars to deliver $1.00 worth of food. Stated in terms of man power, it takes from two to five men to handle a one-man power product.

Among the many proposals that have been made to develop an efficient system of exchange between the farm and table is the postal market or Federal food exchange. Here in the Capital, at Washington, D. C., the plan is being worked out. The Government is using some of the thousands of motor trucks which will soon be released from the National Army. Community centers are being established, and there is the closest co-operation between the farmer and

buyer. All unnecessary distributing agencies are eliminated. Instead of costing from $2.00 to $5.00 to deliver $1.00 in products, it costs only 10 to 15 cents. It is a complete reversal of the inefficient methods of the past. This is one real remedy which rings true with definite results.

I am going to tell you of the remarkable advance that has been made in a period of 12 months, as I have seen it. Operating out of Cleveland, Ohio, the Highways Motor Transport Company has been making quite a showing and has been responsible for greater reproduction because this line has interested the farmer to the extent that he has given more attention to greater production. Large six ton trucks and trailers are being used. During the last summer this company made quite a remarkable record in hauling hot-house vegetables from Geneva and Ashtabula to Cleveland. When fruits and vegetables began to come into the market twenty thousand crates of berries, 25,000 bushels of tomatoes were hauled to the Cleveland markets. These shipments were followed by 20,000 bushels of apples, peaches and beans. You know what we have paid for apples in New York City—from 10 to 15 cents. We are doing it because we have failed to realize that the finest apples in the world are grown in Connecticut and northern New York—and so, of course, we are buying apples which come 3,000 miles from Oregon and Washington. Just think what the cost of apples would be if we could bring them in from Connecticut in motor trucks—of the great quantities which could come in, so that you and I could occasionally eat an apple without feeling guilty. With this lower cost and greater consumption, the merchant would still make more because of the added consumption. We are doing ourselves a great deal of harm when we permit apples to rot in New England and show a willingness to pay for a product which carries with it a long haulage cost. This same company hauled 84,000 baskets of grapes into Cleveland last summer. Trailer trains were also used and to show you the economy of this kind of an operation 230 bushels of tomatoes were hauled on the trailer while the truck carried 291 bushels of tomatoes, 9 bushels of cucumbers, 80 baskets of peaches and 13 cans of cottage cheese.

Another line operating over the Alleghany mountains from Johnstown, Pa., hauled 115 bushels of potatoes to the load in three hours. The distance of this route is 35 miles. About four months ago I learned that the farmers on Long Island were intensely interested in rural express, so J. Kent Warden started out operating two five-ton trucks. Today he is operating eight large five-ton units. When Mr. Warden started he had a small shipping station on Greenwich Avenue, but his growth has been so fast that he has had to abandon it and now has a large receiving station at West End Avenue and 64th Street, under a four year lease. He also maintains a central station in Long Island City. Mr. Warden operates, running out, along the South Shore as far as East Hampton. He carries everything that the people in these villages require, including full loads of dressed beef for the markets. On his return trip, along the North Shore, starting from Huntington, he brings in full loads of everything that the island produces including oysters and fish. This line has been hauling oysters and has netted Mr. Warden $100.00 a day profit. Plans are practically completed for Mr. Warden to haul fish and he estimates that he will receive for shipment to New York from 500 to 600 barrels of fish per night. This is all remarkable when you consider that this line has developed over a period of only four months, and it is especially so when you consider that Mr. Warden's first load gave him a return of about $8.00 gross, whereas it cost him to run his truck in the neighborhood of $30.00.

Lines are running out of Philadelphia, out of McConnellsville and into and out of Pittsburgh. The progress was so rapid that it was hard to keep pace

with it. The Omaha stock yard figures in the haulage of live stock which were published the first of the year, have been very interesting. The facts revealed that a greater part of the 250,000 animals delivered from the farms within a radius of 75 miles of the stock yards came in by motor truck.

"A 100 mile truck line between Portland and Salem with stops at farms and towns enroute". In the seventies Captain Hugh B. Scott began the operation of a light draft steamer on the Williamette River between Portland and Salem. This was very much a business venture in those days and few people believed the line would succeed. But it did. The steamboat line was a success for a time, but the Southern Pacific Railroad furnished speedier transportation between these two points which almost wholly replaced the slower steamboats some years later. However, short haul lines are not profitable to the railroads, and the 55 miles between Portland and Salem is in this short haul class. It is on such hauls that motor trucks are demonstrating their value. Such a motor truck line, the Highway Rapid Transit, has been in operation several months and strange to say E. B. Scott, the son of Captain H. B. Scott is the man who first put on a fleet of trucks just as his father first turned to the steamboats. Three Federals are in use, two of 3½ tons and a two tonner, the heavy trucks making a round trip every 24 hours, thus giving day and night service. The two tonner makes the round trip only on rush days, being used mostly on pick-up and delivery work at Portland. The company contemplates putting on one-tonners at each end for pick-up work, and using the two tonner on regular schedule. The freight rate ranges from 30 cents to 40 cents per 100 pounds. The line has had so much business that 5 tons have been carried every trip. The main difficulty just now is some twenty miles of rather rough and muddy roads that mean slow going and some delay. This stretch lengthens the time to about nine hours for the 55 mile trip one way. However, considering all necessary stops, this 110 miles every 24 hours is very good time. When the character of the country through which the line passes is understood, the value of the service is even more apparent. The entire route over the Pacific Highway, is well settled, most of the land being fertile agricultural land. From these farms, milk, butter, eggs, poultry, veal, hogs and vegetables are sent into market. The night truck brings in most of the farm products arriving at best time to market such produce and bringing it in better condition. The line has increased the production of farm produce by furnishing better marketing facilities. It enables the farmer to dispose of small lots of produce, milk, or eggs, which otherwise would never reach the market. This increases the farmers output and profits and because of added supply, will tend to reduce prices to consumer. The line also cuts out middlemen, as the farmer can send direct to the market. This is indeed a practical application of the principles of the Rural Motor Express as advocated by the Highways Transport Committee.

Down in Dallas, Texas, W. F. Brittson is operating a Rural Express train. His trucks go out hauling four trailers to Farmersville, Texas. The load consisted of 70 head of sheep and 17 head of steers, net weight of load 29,500 pounds. The distance traveled with this load was 90 miles, 22 miles of which was over black land roads.

In Harford County, Maryland the railway service was so unsatisfactory that rural motor express routes were laid out and finally operated. The Harford Co-operative Ass'n, first operated between Bel Air and Churchville and Baltimore, hauling milk, cream and other farm produce to the city and food stuff, seeds, salt, fertilizer, machinery and supplies for the rural merchants on the return trip. As soon as the project was well under way a central receiving station was established in Baltimore for the reception and centralization of the

supplies to be returned to the country. No attempt has been made by the association to earn dividends. Rates are made with a view to meeting the expenses, providing for depreciation, and accumulating a surplus to be used as working capital. The rate on goods classified as first class and inclusive of apples, axle grease, baskets, butter, beans, buckets, buckwheat, barley, empty barrels, blankets, blacking, canned goods, coffee, cabbages, cantaloupes, fish, groceries, hardware, dressed hogs, harness, hay, iron, molasses, machinery under 400 pounds, notions, oils, onions, oranges, potatoes, dressed poultry, stoves, auto tires, vegetables, and automobile, auto truck, buggy, and wagon wheels is 15 cents a hundredweight, while second-class articles such as axes are hauled for 12 cents a hundred pounds. Calves are transported to market for 50 cents a piece, while live cattle and hogs are handled at 50 cents a hundredweight. It costs 25 cents a coop to ship chickens, while cream and milk are hauled at 2½ cents a gallon, the empty cans being returned. The Harford Co-operative Association has fulfilled the purpose for which it was organized. It provides satisfactory transportation services at lower rates than the local railroad customarily charges, while the convenience of the farm to farm pick-up service is very pleasing to the farmers. For the hauling of milk and cream, which constitutes the bulk of the business of the Harford Association, the truck system provides superior facilities to those furnished by rail, especially in that it minimizes the damages and loss of milk cans which, in the instance of railroad transportation, usually represents a heavy outlay.

A line running between Denver and Evergreen, Col. carries milk and other food products to market; there is one running from Redding to Cedarville, Col. 52 miles over mountains. It makes the round trip at a total cost of $25.00 in 11 hours. It has taken the place of an 8-horse team, which took 7 days to make the round trip at a cost of $14.00 a day, total $98.00. The above are a few instances which will show you how economical and profitable a Rural Express can be under the right kind of management. New lines are coming into existance daily in great numbers. The Highway Transport Committee of Iowa reports that one new company at Sioux City is starting with 50 trucks, which it states, are in a class by themselves. Farm hauling may not be called rural express, but it is pretty close to it.

WHAT MOTOR TRUCKS ARE DOING FOR FARMERS. The use of motor trucks with the farmer might be said to be developing just as rapidly as the farmer is learning to think in terms of road mileage. When he ceases to think of transportation wholly in terms of horse power and can comprehend the cost a mile a pound regardless of the power used, then the sale of motor trucks will be tremendous. However, trucks are being used to replace railway service or rather extending the farmers marketing radius and bringing the distant city markets within hauling distance of his farm. So we may say that while the truck is being introduced largely because it offers cheaper hauling than the horses, yet a factor almost as important is its ability to do things that are entirely beyond the range of the horse. Probably the best illustration of the latter is the hauling of livestock from the farms to the large packing centers.

"Motor Trucks", says E. M. Carroll, Traffic Manager of the St. Joseph Stock Yards Company, "are being used here to a large extent. We have had truck loads in here from as far east as Chillicothe, Mo., a distance of about 85 miles by rail. We also have received livestock by truck from across the Iowa line, a distance of from 70 to 80 miles. There are trucks making regular trips to the market from points as far as 65 to 70 miles distant. These trucks not only haul hogs, but they bring in cattle, calves and sheep and very frequently they bring in mixed loads, separated by partitions. Our largest day's receipts

from this source were slightly more than 1,400 hogs and nearly 200 head of cattle and calves and 200 sheep. We did not count the vehicles employed to bring this stock to market, but we estimate that there were close to 250 trucks and wagons, of which 75 per cent. were trucks. For the 9 months ending Sept. 30th, we received from this source 75,211 hogs; for the same period in 1917 we received 33,286; for the entire year of 1917, 56,529, while in 1916 our receipts were 52,048. For 24 days of October this year we received 11,622 cattle, 418 calves, 16,150 hogs, and 25,922 sheep; for the entire month of October 1917, we received 801 cattle, 877 calves, 5,834 hogs and 1,607 sheep. Most of the trucks employed in bringing stock to market are engaged in this business regularly and they range from small trailers attached to the rear end of passenger vehicles to 4 and 5 ton trucks. These larger trucks have a capacity of as much as one third of a regular railroad car of stock. Many of these trucks are able to get a return load, especially those that come from or pass through inland towns or towns not located on railroads. Some of these trucks are owned and operated by regular dealers located in the country, but the majority of them simply are engaged in transporting livestock and make a charge of so much a head or load. We believe that this movement is permanent and are going to increase our facilities for taking care of it."

Highway haulage is making a large place for itself in the reconstructed transportation system of our country and now Mr. Charles A. Morse, Assistant Director of Operation in charge of Engineering and Maintenance, United States Railroad Administration in a recent speech, told the New York Railroad Club that motor truck routes are to substitute railway branch lines. Congressman Baer of North Dakota states that the motor truck is a carrier which seems to be the most feasible and practical of any for solving our National problems of to-day. Even Canada is turning to it for in a letter we have received from S. J. McLean, Commissioner, Board of Railway Commissioners for Canada at Ottawa, he states: "I am very much interested in the question of improved utilization of highways in the carriage of traffic". Even in old England we find that the development of the motor lorry services has been a tremendous boom to commerce and suburban sections.

The coming of highway motor transportation means that a greater day is breaking and that a greater United States is in the making for they reach out everywhere and anywhere under the sun and bring our commerce into real competition with the world.

TRANSPORTATION SURVEYS FOR RURAL MOTOR EXPRESS ROUTES

Presented by J. H. Collins, Member, Highways Transport Committee, Council of National Defense, and Investigator of Market Surveys, United States Department of Agriculture.

Rural motor hauling is a logical extension of the automotive industry in a new and untried field. The motor truck as an auxiliary transportation facility is relatively so new that its actual possibilities and limitations are not thoroughly understood even by those who have been most intimately in contact with the problems of highway transportation. It is but natural then that the development of rural motor express routes has proceeded on anything but a systematic or carefully conceived program. Early efforts in this direction therefore have been productive of much practical experience which will prove very helpful to those just entering the field of rural transportation.

The most common error of the beginner is not as a rule in the selection of his operating equipment, but lies rather in his failure to properly analyze his business prospects in advance. Because securing equipment involves the expenditure of money in advance, the ordinary operator usually exercises reasonable discretion in purchasing his rolling stock. Conversely, because of the fact that no direct outlay of money is involved, he fails to devote sufficient attention in advance to his business arrangements. The common assumption is that a proper volume of business will develop as the route becomes established as a regular carrier. The character of this business and its permanence appear as minor considerations.

Where a new motor route is being considered it is essential that a careful survey be made in advance. A territory which appears at first glance to be admirably adapted to motor hauling may prove very disappointing to the man who actually undertakes to establish such a service. First-hand information can be secured only by a direct canvass of the prospective field of operation. Such a survey to be of value must include all the primary factors which will mean success or failure, yet in actual practice these considerations are only the dictates of good business judgment.

Coming now to a consideration of ways and means, it will be found that two general factors influence the future of a rural motor route. These factors are, (a) the volume of business or tonnage, and (b) those surrounding conditions which have a direct bearing on the business.

Primarily, of course, the profits of a route will vary directly with the tonnage. The greater the prospective tonnage, the greater the profits, other factors considered. Equally important, however, is the distribution of tonnage throughout the season. The truck operator in a district producing grain exclusively, who has offered to him a greater tonnage than he can possibly care for during one month in the year, and who has little or nothing to haul during the other eleven months, is obviously headed toward failure. It is apparent, therefore, that the total quantity of agricultural products moving from the territory under consideration is not an entirely accurate guide for the prospective operator. The ideal territory from the point of view of the motor operator is the area whose total productivity is large, but whose products move to market in a fairly steady stream throughout the year. Regions given over to dairying, important truck farming districts, and areas of intensive but diversified farming have, therefore, proven the most profitable to pioneers in motor transportation.

In making a preliminary survey it is equally important that consideration be given to the character of the tonnage to be moved. Low priced, bulky staples such as hay, as a rule will not bear the motor truck tariff. On the other hand, perishables, which must move to market promptly if deterioration is to be avoided, may readily bear an express tariff because of the speedier service given by the motor truck. Light, bulky products require an undue amount of space and may prove unprofitable as a load. In general, loads which have a high value per unit of weight or size offer the most profitable return.

Although rural express routes may be developed for the purpose of affording more adequate transportation facilities for agricultural communities, it does not necessarily follow that loads should be confined entirely to agricultural products. In many cases tonnage furnished by small industrial plants, country merchants, and city dealers with a rural clientele, has made possible the profitable operation of a rural motor route whose primary function is to serve the farmer. Few farming districts can support a motor route with a tonnage of farm products alone. The operator who serves the farm as distinguished from the rural community generally is pinning his faith to a rather slender support.

The original surveys should also cover the return load feature. It is fairly safe to assert that no rural motor express route can exist entirely on a one way load. Here again arises the necessity for establishing contact with commercial shippers whose dealings include loads both ways. Country merchants as a rule provide a considerable part of the load coming from the city, and the importance of this business cannot be overlooked.

There are a number of external factors which should be carefully canvassed in advance. The character of the roads over which the trucks must run is, of course, a prime consideration. If the road is poor, operating expenses may be so high per mile of operation that no ordinary tonnage will enable the operator to show a profit.

The wise beginner will carefully study existing transportation facilities in the territory he expects to serve. To offer service in a district in direct competition with established carriers whose service is entirely satisfactory, would show poor business judgment. If, however, the motor truck can offer a more direct outlet to market, can move perishable products more speedily, or can offer a more complete pick-up or delivery service, it may successfully establish itself side by side with older carriers whose service will thus be supplemented. The prospective operator should, therefore, pay particular attention to the schedules, collection and delivery arrangements, and rates of existing carriers. No set rule for motor rates can be set forth in advance. If rates on shipments by motor truck, however, are very much out of line with other local rates, it is obvious that no permanent business will be secured. Hence a comparison of rates and service of established carriers is almost essential if the proper rate by motor truck is to be arrived at.

Coming directly to a consideration of the actual method of making a survey of a proposed rural motor route, it will be apparent at once that it will not be possible to personally interview every shipper or potential shipper in advance. Direct personal contact, however, is necessary to a clear understanding of the problem. There are several valuable points of contact available to the prospective operator. The county agricultural agent usually has an intimate first-hand knowledge of conditions surrounding the production and movement of farm products in his county. His suggestions will be based on a knoweldge of local shipping conditions and cannot be overlooked. He is therefore to be considered as an unbiased source of much valuable information.

Local merchants may be approached from two angles, as prospective shippers, and as having fairly comprehensive ideas with respect to the transportation needs of the community. Part of the country merchant's stock in trade is his familiarity with local agricultural and commercial interests. His advance co-operation is therefore of great help.

Local bankers also are abreast of conditions in their respective communities and can offer much that is helpful and informing. As a rule the local banker is in as close touch with conditions in his district as any person who could be approached.

The principal shippers among the farmers must also be visited and their co-operation secured. If the important farmer-shippers will contribute substantially toward the maintenance of a motor express route from the outset, the smaller farmers will soon fall into line. If the larger shippers will not support a route its ultimate success is very problematical. A fair check on the possibilities of a prospective route may be obtained by the operator who attempts to actually secure pledges on a part of his tonnage in advance. Of course advance pledges are out of the question in many cases, but the operator whose patrons evince a willingness to sign up in advance has a tangible evidence of the value of motor service to the community.

In conclusion it may be said that no transportation survey can be outlined in advance in its entirety. Local conditions vary so markedly in different districts that a cut and dried program cannot be worked out which will be applicable to rural districts generally. In the main, however, certain basic factors must be considered and these must constitute the starting point of the survey. The considerations which have been discussed as generalities in this paper are basic in character. A discussion of features to be covered in a transportation survey may leave the impression that such a survey is semi-technical in nature or is a cumbersome or elaborate piece of work for the practical man who desires to venture in the field of motor transportation. In actual practice, however, such a survey is surprisingly simple. The considerations which have been discussed as separate problems are seen grouped as one problem in connection with a survey made in any particular district. Considering the value of such a survey it is difficult to see how it can be neglected if a new motor route is to be successful from the start. In the final analysis a transportation survey for a rural motor express route is merely the application of business foresight and judgment to a practical business proposition, and the actual conduct of such a survey can safely be left to the man who is guided by common sense rather than by technicalities.

WANTED: RURAL MOTOR EXPRESS IN THE STATE OF NEW YORK

Presented by James E. Boyle, Extension Professor of Rural Economy, College of Agriculture, Cornell University

The greatest speech on the subject of transportation ever made, in my opinion, was made in this city on November 22, 1910, by Hon. Martin A. Knapp, Chairman of the Interstate Commerce Commission. He pointed out the sudden transition from ox-drawn and horse-drawn vehicles to the use of steam power, and the rapid spread of the railway net over the United States, through forests and deserts, across the great rivers and through the mountain chains. "In the passing of a generation", said Judge Knapp, "the railroad and steamship have transformed the whole realm of commerce, of industry, and of social life; they have enriched every pursuit, given multiplied value to every location, added incalculably to the means of human enjoyment, made our vast wealth possible; and they are at once the greatest achievements and the greatest necessity of our modern civilization."

Here we have a fair statement of the fundamental value of transportation in developing a State. We know that in comparison with the railroads of other countries, our roads carry lower capitalization and give better service at lower rates. However, this is not saying that the railroads are successfully meeting the needs of newer forms of transportation developed since the coming of the gasoline engine. Improvements in railroads in recent years have largely taken the form of putting on heavier rolling stock and hauling increasingly heavier loads; an increasing use is also being made of electric power, and of gasoline motors. But whatever the causes may be, in the past few years transportation needs have outstripped railway development. This is true not only along the branch lines and feeders for the main lines, but along the main lines themselves. The demand now is primarily for better service rather than cheaper service. To select one factor of weakness alone in our present railway transportation, the subject of speed of freight trains may be mentioned. I made an investigation in Minnesota of the long haul of potatoes to market in 1915, in refrigerator cars. The average speed of trains under the normal conditions then prevailing was

four miles an hour—which is exactly the speed of a wagon drawn by a team of farm horses. A dealer in Rochester, N. Y., recently ordered a car of potatoes shipped to Buffalo from a small town one hundred and ten miles distant. This shipment was on the way nine days, an average speed of one-half mile per hour. It is, however, unnecessary to point out the shortcomings of the railroads, since they have met their major requirements so well.

New Transportation Needs in New York State. The growth of transportation facilities should keep pace with the growth of population. And since rural population has been steadily decreasing in most New York counties, it might seem, on the face of it, that there should be a corresponding decrease in rural transportation facilities. But this is not the case. There has been a shift in population. Most decreases in rural population have been offset, and more than offset, by the increase in the nearby city population. This shifting of population has doubtless made certain branch lines of railways extremely unprofitable to maintain and operate. Railways, being fixed to the soil, have not been able to meet these shifts in population. A shifting of population requires a new allocation of transportation routes, or a change in transportation methods.

(1). Along branch railways. In view of the fact just stated, we see then the need of a rural motor express service serving approximately the area served by some of the branch railways, and probably extending the service a little farther back into the country. This would involve the junking of the railway lines in such cases, a process now already begun in some sections.

(2). The country store problem. New York is a State very thickly dotted with country villages back in the hills and along the valleys, and hundreds of which stores are not located on the railroad. Many of these stores still use the costly method of horse-and-wagon transport to haul their supplies from the urban center where they have their trade connections. This means a steady stream of heavy supplies such as flour and feed stuffs is moved over the country road in the most primitive and expensive fashion. A string of such villages could be organized into a rural motor express route, at a great saving to both the merchant and his customers.

(3). Along the main railroad lines. Along the main arteries of railway transportation city populations have shown a tremendous increase. Here is where the inter-city motor express has already reached a substantial development. It is a question whether or not the time has come for such inter-city motor lines to develop a local service, reaching the small towns and villages not only on the main route but tributary to it.

(4). Dairy section. In the important dairy sections of New York, a rural motor express service is now needed to distribute the feed stuffs to the farms, and to collect the milk from the farms. This traffic is heavy enough and constant enough doubtless to warrant such an investment.

(5). Produce sections. Much fruit and produce grown in New York never reaches the consumer. Much of this stuff rots on the ground. For instance it was my experience last fall to be in and out of several counties, and to note many hundreds of bushels of apples rotting on the ground, partly due to lack of labor and partly due to lack of transportation facilities. And only last week I inquired in eight stores in the city in which I live, for New York eating apples. None were to be had. But these stores had plenty of Oregon apples at eight cents apiece. There were enough apples rotted on the ground within thirty miles of my home city, without doubt, to supply the whole population for a year. With hay selling at forty dollars a ton, as it has been this spring, it is not likely that there will be a substantial increase in the horse population and in transportation facilities by horse-drawn vehicles. There is a big waste by

freight cross hauls now which can be overcome by an adequate system of rural transportation. An investigation of the amount of produce shipped out, and of produce shipped into the State will reveal a big economic waste, which must be added to the waste caused by rotting on the ground.

(6). Flow of the freight. Last year the federal government made a study of the flow of the grain from the Chicago territory into the City of Chicago. Some 250,000 cars were traced in this way. One interesting fact revealed was that a rural district, such as a community in Iowa, for instance, might have an apparent huge surplus of corn, and in consequence this corn would flow along the railroad routes to the big city terminal. A few months later, it would be discovered that many stock feeders in that same rural community would be short of corn, necessitating the backward flow of grain from the terminal to the farms. While this movement was going on, this backward flow of grain, many local stations, quite near the stock feeding farmers, would be shipping their grain to the big terminal.

In other words, the big problem before the railroads, which they have doubtless met in a big way, was to act like the brooks. The small streams and rivers, uniting their streams into a warm trunk channel, and thus carry the farm produce to the city terminals. But the effect has been that when a shortage or scarcity arises anywhere, it is felt first, not at the terminals but back in the producing section.

This may be illustrated by the hay situation in New York State at the present time. Hay flows freely along the railroads to the New York market, especially in view of the record prices reached this spring. In consequence, many dairy sections in the Eastern and Northern parts of the State are reporting a hay famine. A late spring has made the pasture a little less than usual. The difference in price between the farm area and the New York price of hay was $3.00 a ton in January, and increased to $8.00 in April and to $11.00 in May.

This indicates that the hay along the railroads has been moved to the big markets, but that on the farms more remote a hay supply still exists. These two illustrations indicate the need of a subsidiary or supplementary system of transportation, functioning where the railroads either do not function at all or function in a very expensive manner.

(7). Bind together Rural Communities. An economic and social need of the farmers is to have the isolation of farm life lessened. Rural motor lines will contribute to this end to a very remarkable degree.

(8). Club over the Railroads. Critics of foreign systems have mentioned the canal systems of Germany, Belgium and the Netherlands as being strong forces in keeping railway rates on a proper basis. A rural motor express service once developed would have a similar influence in this country.

Summary of Needs. It is evident that the great increase in population in New York State as a whole and the shifting of population within the counties have rendered necessary and imperative changes and improvements in the transportation facilities of the State. Evolution has produced the motor truck to meet the new conditions. The practical problem now is one of pioneering—who will try out the new methods, and where and how? It is only fair to state at this point some of the limitations which are to be met in organizing rural motor express lines.

LIMITATIONS.

(1). Engineering. The engineering problems do not fall within my field, but in a general way they may be mentioned. While New York has "good roads" when compared with some States, yet the lack of good roads is a condition confronting the rural motor express business. More mileage of better surfaced roads is needed, and will doubtless come as the motor truck lines develop.

The two work together as cause and effect. An inter-city motor express which recently failed was operating five ton trucks. The size of the truck is an engineering and an economic problem which should be capable of solution. So likewise is the question of repairs and the time lost on repairs. If we permit ourselves to dip into the future, very likely the time will come when gasoline is used less and New York's water power is used more. We may see a development of electric transportation, over our highways, by means of trackless trolleys like those in common use in Europe.

(2). Economic. The primary economic problem is the volume of business and its distribution. A well planned route should find business throughout the year, and also business for the return haul.

(3). Franchise. The franchise question is one of the most serious ones, and one at present unprovided for. A heavy investment in the motor express business must contain at present a speculative element due to the task of a standard franchise. A state law providing for the strict regulation of competition, of rates, and of other matters, under a franchise, and for a tax to be used solely for highway improvement, would tend to standardize the business. Wisconsin has a law prohibiting competition in certain public utilities. While it would not be desirable or feasible to prohibit competition in the rural motor express service, it would be highly desirable to so regulate competition as to furnish some safeguard to well-placed investments.

(4). Human Factor. In talking with persons in touch with both the success and failure of motor express lines, I am impressed with the unique and peculiar importance of the human factor in this business—the driver of the truck. Here you have an expensive piece of machinery, in charge of a semi-skilled laborer, hired by the week, and operating far from the supervision of his employer. In fact, the driver of the truck clearly has it in his power to make or break the business. He seems successfully to defy all supervision thus far. He knows the machine is "not his". He will upset in the ditch occasionally. He will loaf at one point, and then overspeed the truck to the next point, removing the belt of the governors. In fact, the stories told about the deeds of these drivers are quite disheartening, with their drinkings, and carousings, and stealings, and general all-around cussedness. Evidently the problem is primarily one of hiring the right men and then keeping them loyal by some scheme of recognition or advancements. In case of a large motor express company, trucks might well go in fleets in charge of an overseer. However, the question of honest and efficient drivers is one of fundamental importance. I am inclined to take the optimistic view of it and believe that such men can be had, and at reasonable wages. If they cannot be found, then it is time to take an inventory of our moral and economic resources, and, in the language of Jerry Simpson, "see where we're at".

Conclusions. The rural motor express is already here. It is a reality. It has come to stay and grow larger. The need now is to bring to bear on this service constructive criticisms, constructive suggestions and broad plans for legislative measures to meet the new needs peculiar to new business. Such a program is worthy of the best brains of the country.

HIGHWAY TRANSPORT ENGINEERING.
Presidential Address by Arthur H. Blanchard.

The United States is entering upon a period of phenomenal expansion of highway improvement and motor transport. This country has witnessed a rapid growth in the utilization of the motor vehicle as indicated by a registration of

125,000 motor vehicles in 1908 and 6,146,617 in 1918. While in 1908 a motor truck was rarely seen on American highways, in 1918 not less than 600,000 were in use in the United States, motor trucks constituting from ten to twenty per cent. of the registered motor vehicles in the several States. Highway improvement has not kept pace with the increase in the utilization of motor vehicles. The fundamental basic axiom that economic highway transport is impossible without good roads should be fully recognized. A review of the present status of highway improvement in the United States indicates that there are about 2,500,000 miles of rural highways; that 12 per cent. are classified as improved; and that about one-fourth of one per cent. are suitable for trunk highway motor truck traffic.

In England, the improvement of the main country roads preceded the development of highway transport. When transportation of heavy loads on commodities over highways was inaugurated prior to 1890, England did not have to wait for the construction of highway systems, with the result that rapid growth of highway transport took place. It is not surprising, therefore, that English highway transport methods had reached the same stage of development in 1909 which exists in the United States in 1919. The writer had the opportunity of investigating highway transport in England in 1909 and 1910 and found, at that time, the same problems with reference to development of highway transportation and legislation that exist in this country today. As early as 1891, Fletcher, in writing on "Transportation on Common Roads", considered some of the classes of highway transport now under discussion in the United States and cited many instances of conflict between highway authorities and highway transport interests regarding some of the fundamentals of highway design. Pratt in 1912, treating of the subject of inland transport in England presents many of the phases of the problem now confronting us with reference to what he calls "Back to the Land Movement". In 1910, Henry B. Drowne and the writer prepared a paper on "English and American Highway Traffic Regulations" in which the English traffic laws of 1896 and 1903 were referred to with special reference to weights, speed and dimensions of motor vehicles and trailers. A thorough study of the development of highway transport and legislation in England would be of material benefit to many in the United States who seem to be of the opinion that they are treading on virgin soil.

The human, economic and social forces working for the improvement of highways and motor transport development in the United States are of such powerful character that nothing can permanently restrict progress in the construction of good roads and the growth of highway transport. Through no other agencies is it practicable to stabilize urban and rural development, to appreciably reduce the high cost of living as far as food stuffs are concerned, to bring the producer and consumer into close contact, and to solve some of the vital labor problems.

The development of highway transportation creates a demand for men having knowledge of and trained in a new technical field, which may be designated HIGHWAY TRANSPORT ENGINEERING. Fundamentally, this branch of engineering deals with the science, art, economics, and business of highway transportation of passengers and commodities. In the opinion of some, highway transport may not be considered as belonging to the field of technical training and education. On sober thought, however, it will be seen that this branch of knowledge comes well within the classic definition of engineering embodied in the Royal Charter of the Institution of Civil Engineers of Great Britain, which, in part, is as follows: "The art of directing the great sources of power in nature for the use and convenience of man as the means of production and of traffic in states both for external and internal trade."

The breadth of training for this branch of engineering should be far more comprehensive than has been considered essential for many technical branches. Breadth of knowledge is essential, as the highway transport engineer must, in many fields, deal with social and economic conditions and must always have before him the fundamentals of sound business methods.

Comprehensive courses in highway transport engineering to be offered by educational institutions, should include the following basic fundamental subjects: Economics, political economy, social science, business and contract law, scientific management, business organization, cost accounting, inter-state commerce, marketing and distributing systems.

The highway transport engineer or manager should have a knowledge of all of the following special subjects:

History of American transportation and rural development. English highway transport methods and legislation. Interrelationship of highway, railway and waterway transportation including: Influencing factors of distances, rates, kinds of freight, equipment, port, terminal and warehouse facilities. Interrelationship of highway transport, good roads and rural development. "Back to the Farm" movement, which is a function of three fundamentals, namely, building of systems of good roads, utilization of highway transport, and establishment of economic distribution from producer to consumer.

American highway traffic legislation: National, state, county, township and municipal laws, licenses, taxes and traffic regulations, especially those covering speeds, weights and dimensions of motor trucks, trailers and motor busses.

Fundamentals of highway engineering affecting economic highway transport including: Administration of highway departments; highway systems; location, drainage, foundations, grades, curves, widths and shoulders of highways; characteristics of different kinds of roadway with particular reference to traction; snow removal; guard rails, culverts and bridges; highway signs.

American highway transport methods: Comparison of horse and motor transport, municipal haulage, municipal delivery systems, store door delivery, inter-city haulage, long and short haulage outside of cities, rural motor express, return loads bureaus, motor truck parcel post, plant and factory haulage, army transport methods, horse transportation methods. Efficient methods of packing, handling, loading and unloading raw and manufactured materials. Highway transport management. Fundamentals of cost of highway transport. Cost and record systems. Organization of motor haulage companies. Labor for highway transport.

Motor truck, motor-bus, tractor and trailer mechanism, operation, inspection, maintenance, repairs and cost data. Adaptability of different types of trucks and bodies. Disadvantages of overloading and overspeeding. Economic utilization of tractors and trailers. Garages. Accessories, such as tires, fuels, lubricants and mechanical devices.

Transportation surveys, being investigations of highway routes, highway transport legislation, traffic regulations, rural and urban transportation opportunities, competing carriers including railway, waterway and other highway transport facilities, and all other factors which may affect the transportation business which it is intended to establish.

HIGHWAY REQUIREMENTS FOR TWENTIETH CENTURY TRANSPORTATION

Presented by W. G. Thompson, State Highway Engineer of New Jersey.

So many different factors enter into consideration of this subject that it is difficult to state and classify them in the order of their relative importance. The

first factor is Traffic—present and future. For what weight and size of vehicle must the highway of tomorrow be constructed? Next comes future volume of traffic, which can not be estimated with any degree of accuracy, since, prior to 1912 no really widespread movement for construction of high-class pavements in the rural or interurban districts was noticeable, further, that paving of roads in any particular locality increases not only the number of motor vehicles owned in that locality, but the use of its roads by foreign cars, whose owners are ever seeking new routes for business and pleasure. Therefore, we can hardly venture a prediction as to the increase in volume during the next fifteen years. It would seem, then, that our design can be influenced only by an arbitrary estimate or determination of future needs as to the widths of pavements in order to obviate congestion. The same is true as to thickness or depth of foundation, since there is no precedent to guide design, because no pavement has heretofore been designed to carry a specific loading. Here again enter variables, such as impact at varying speeds and loads and varying sub-foundation conditions.

The Bureau of Public Roads in Washington is now making tests to determine the extent and effect of impact on pavements. These tests, extensively conducted on each type of modern pavement and covering varying foundation conditions, should prove of great value to the highway engineers of the country.

Lacking specific data, and precedent, highway engineers are now making use of the best types known today, such as Portland cement concrete and brick, stone block and asphaltic concrete on concrete foundation, and hope they will last for fifteen or twenty years. Since I am more familiar with conditions in New Jersey, I will outline what is now being done on the State Highway System there in an earnest effort to provide for the future traffic, highways which shall be smooth and convient to motor traffic at all times of the year.

ALIGNMENT, GRADES, AND WIDTH. On all State Highways, the graded width or carriage-way from gutter to gutter will be not less than 30 feet. In the open country we are going to considerable expense to secure curves not sharper than 6 degrees, and grades not exceeding 5 per cent. All curves sharper than 5 degrees are being super-elevated or banked, there being a gradual transition from the straightaway to the curved section. This method has already proven its value as an aid to easy riding, since there is no perceptible strain or overturning motion while rounding the curves so treated.

DRAINAGE. Particular attention is being given to sub-foundation drainage, upon the adequacy of which the integrity of the pavement depends in marked degree. It is believed that expense incurred on this factor, before the pavement is laid, is justified because the pavement may be rebuilt or rejuvenated from time to time without entire removal to correct drainage conditions which should have been cared for during the initial construction. On long flat stretches storm sewers are being built with catch basins to carry off surface water which would not flow in flat grade side ditches or gutters.

PAVEMENTS. Hard pavements will be not less than 18 feet wide. In addition there will be 3 ft. stone shoulders on each side, making in effect, 24 ft. pavements. There will then be 3 ft. earth or gravel shoulders, making a total of 30 feet carriage or travelled way. On the main, heavily travelled routes are being laid concrete pavements 8 inches thick at the sides and 10-½ inches thick at the center. On the secondary routes are being laid concrete pavements 6 inches thick at the sides and 8-½ inches thick at the center. Where asphaltic, brick or stone block pavements are used they will have concrete foundations not less than 6 inches thick, except that in the more isolated sections, where traffic will not be heavy for many years, asphaltic pavements will be laid on existing macadam bases, where such exist of proper width and depth. None

of the State Highways will be paved with macadam or bituminous macadam, or any other material inferior to asphalt or concrete.

A sincere effort is being made to build for the highway traffic demands of tomorrow. In alignment, width, grade and pavement, the viewpoint is that we are building for a long time to come and the best obtainable, within reasonable financial limits, should be had now. In the Engineering News for May 8 is found this question ("Why are such revolutionary changes necessary in pavements which have given satisfactory service on heavy traffic city streets heretofore?") It seems to me there are several good reasons for the building of city pavements on interurban and country highways. In the first place, city streets, until the past three years, were never subjected to the test to which they are now, and will hereafter be subjected, and it remains to be proven that present city pavements will stand the new strain. We can all remember when no vehicle using New York streets travelled at a greater speed than four or five miles per hour. Heavy horse-drawn trucks downtown moved three or four miles per hour. Now, motor trucks with the same and heavier loads travel 15 or 20 miles per hour. On rough pavements the impact and destructive forces are, therefore, now many times greater, notwithstanding the change to solid rubber tires. If these things be true in crowded city streets, will they not be more true on country highways, where, when city restrictions as to speed no longer hold, every class of motor vehicle increases its speed to twenty-five or thirty miles per hour. I am convinced that if speed alone were to be considered, it will be necessary to build stronger pavements on interurban highways than on city streets, especially in New Jersey, where, because of its many industries, the motor trucking between cities is very heavy today. Tomorrow will but bring a greater volume and density.

The drainage factor also requires that heavier pavement foundations be built on interurban highways. City streets are usually paved from curb to curb. They are underlaid by sewers, pipe lines, conduits, etc., all of which conduce to good sub-foundation drainage, while surface water runs to the gutters and is quickly carried away by the sewers. In the country, and especially in cuts, there are springs, the menace of which it is difficult to remove. Water from open ditches and hillsides seeps into and under the foundation. In wet weather, the foundation is softened. In cold weather, the saturated foundation freezes and expands, heaving the pavement and often breaks the surface. Considering the destructive effect of impact at high speed, and of inadequate drainage, and the relative effect of these two factors on city pavements, it is believed justification exists for building heavier pavements in the country than in the cities.

BRIDGES. Our state Highway bridges are being designed and built for a loading of 20 tons, it being assumed that 75 per cent. of the vehicle load will be on the rear axle. Under bridges spanning the highways, vertical clearance will be not less than 14 feet from pavement to under side of girder.

GRADE CROSSINGS—RAILROAD. Railroad grade crossings are being eliminated wherever and as rapidly as practicable. In one instance of a section of the State Highway now under construction, the relocation of the highway to parallel the railroad will do away with eight grade crossings within four miles; this includes the parallel tracks of two different railway systems.

SIGNS. A comprehensive system of road signs is being installed to indicate direction, distance, dangerous crossings, curves and grades. These will be substantial, having concrete posts, and the inscriptions so designed and worded as to enable the motorist to proceed with the least inconvenience and loss of time.

Observing the singular lack of markers to enable motorists to proceed through city streets while enroute from one city to another, and to quickly reach the trunk highway, we are marking the street corners with a distinctive sign, which will enable tourists to pass from the State Highway entering the city, through the widest streets in the most direct manner possible, to the State Highway leaving the city. At present there are few corners on through routes in large cities so marked as to expedite movement of through traffic.

In order that there shall be no unpaved sections through small cities and towns on the State Highways, the State will pave at its expense through all municipalities having a population under 12,000. With municipalities having a population exceeding 12,000, the State may enter and is now entering into agreement with such cities, by which each shall pay a portion of the cost. In many of the smaller communities the town authorities are paving from the State pavement to the curb. The routes of all State Highways are so designated or laid out as to enter the large cities through their widest streets, so through traffic will not have to use the narrow, congested city streets. The county engineers of New Jersey, with the State Highway Department, have adopted a standard system of marking, so all highways under county control will be thoroughly posted in the same manner as the State Highways. These facts are cited, simply to show that the coming needs are fully realized, and earnest effort is being made to provide for them. Briefly stated, Highway Requirements for the 20th Century Transportation as we see them are the following: Ample funds, good alignment with flat curves and low grades; adequate sub-foundation drainage, the widest, strongest, toughest pavements obtainable; where they enter large cities paved widths should be several feet wider than in open country. Bridges designed for at least 20 ton loads, few or no railroad grade crossings; a comprehensive, thorough system of marking for distance, directions, and dangerous conditions; and a system of reasonable and enforced traffic laws which will protect all motorists, yet permit the expeditious movement of traffic.

The State Highway Commission has published and is now circulating an official map of the State Highways, showing all State and County roads, indicating sections of routes under construction, and printed data concerning detours, to enable motorists to most conveniently avoid the construction work. This map and information will be revised from year to year as the work proceeds, so as to be always up-to-date.

This paper was supposed to deal with what are considered to be highway requirements necessary for the 20th century; in setting forth herein what New Jersey is doing, I am but reflecting the ideas of its Highway Commission, which is trying to foresee the requirements, and is building accordingly. It realizes that in many localities the pavements should be wider, but is building the best its finances will permit, confidently believing that the system, when completed along present lines, will prove so satisfactory that the public will provide additional funds for extensions and improvements.

UTL AT DOWNSVIEW
D RANGE BAY SHLF POS ITEM C
39 14 05 25 14 027 2

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY

H&SS
A
6230